



UNIVERSITY of
RWANDA

COLLEGE OF MEDICINE AND HEALTH SCIENCES
SCHOOL OF HEALTH SCIENCES

**REDUCING WASTE MIXTURE IN ACCIDENT & EMERGENCY
DEPARTMENT AT KING FAISAL HOSPITAL**

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Masters of Hospital and Healthcare Administration

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REDUCING WASTE MIXTURE IN ACCIDENT & EMERGENCY
DEPARTMENT AT KING FAISAL HOSPITAL

*A dissertation submitted in partial fulfillment of the requirements for award of
Master of Hospital and Healthcare Administration (MHA)*

BY

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October, July 2019

SUPERVISOR’S DECLARATION:

I hereby declare that this capstone entitled “**REDUCING WASTE MIXTURE IN ACCIDENT & EMERGENCY DEPARTMENT AT KING FAISAL HOSPITAL**” to the best of my knowledge was carried out, prepared and conducted under my direct supervision in accordance with the degree regulations.

It represents the original work of the candidate and the contribution made to the study by me, by other members of the supervisory team, by other members of staff of the University and by others was consistent with normal supervisory practice and external contributions to the research were acknowledged.

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I, **Claudine UMUGWANEZA**, hereby declare that this capstone dissertation project entitled **REDUCING WASTE MIXTURE IN ACCIDENT & EMERGENCY DEPARTMENT AT KING FAISAL HOSPITAL** is my original work. It contains no materials previously published or written by other persons, nor materials which to a substantial extent has been accepted for the award of any other degrees at any other educational institutions except where due acknowledgement is made. Any contributions made by other researchers are explicitly acknowledged in this report.

Signature: _____

Date: _____

DEDICATION

This capstone Dissertation is dedicated to:

My Husband Jude MUSAFIRI

Your gentle spirit enabled me to keep the school journey

My children: Nissi Janice MUSAFIRI, Nava Joanna MUSAFIRI, Nanda Joella MUSAFIRI and
Nael Jude MUSAFIRI

Your presence is heaven to me and it gave me the courage to cross this lace

My parents, MUKANDOLI Marie and NYABUDARAZA Faustin, (RIP)

You have gone so early but the tiny girl has grown into the woman you always wished to see.

My elder brother Claude KAYITARE

You took over the parent's role for me and I'm forever grateful

My mother in law Joyce MUKANKULIZA

You are a confident source of advice and you have a great strength of character

My in laws Bella, Augustin and Jackson

You are God's gift to me.

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I sincerely appreciate all who have contributed to the success of this study, mainly students of Cohort four, MHA- Program.

ABSTRACT

Background

Health care activities generate different kind of wastes. These activities involving health promotion, medical diagnosis, treatment, scientific research, dental services. When the wastes from those ventures are not well managed, they are harmful to the humans and the environment. WHO reports that 2.3 to 4.6 people are infected by hepatitis B and C and 80,000 to 16,000 people are contaminated with Human Immunodeficiency Virus (HIV) due to unsafe disposal of sharps and poor waste management.

Aim of the study: This project aimed to reduce the waste mixture rate in Accident and Emergency at King Faisal Hospital.

Methods

A pre and post intervention study was done to reduce the waste mixture by increasing the number of dustbins, putting waste segregation signs, close supervision measures and training on waste sorting at Accident and Emergency department, King Faisal Hospital. Observation in 23 dustbins was done, three times a day in each dustbin to measure the magnitude of the waste mixture in accident and Emergency, King Faisal Hospital.

McNemar tests were used to compare the pre and post intervention on medical waste mixture and the measures taken. Data analysis was completed using SPSS version 22 at significance of $\leq P0,05$.

Results: The waste mixture improved from 84% in pre intervention to 15% in post intervention with P-value 0.001. The waste mixture in the red bin improved from 44.1% to 7.6%, the waste mixture in white bin improved from 3.3 % to 0.9% ,the waste mixture in the yellow bin from 5.1% to 0.9 % and the waste mixture in the black bins improved from 48.3% to 7.9 % .

Conclusion: the reduction of waste mixture was achieved through training of the staff on waste sorting using color coding, infarcising on policy reading daily, every nurse was allocated in a specific room to facilitate close supervision, waste disposal tags were put in place on the dustbins, new bins were bought and labeled with waste disposal signs thus resulted into a tremendous reduction of waste mixture.

KEY WORDS: Reduction, Waste mixture, Sorting, WHO, Accident and Emergency, King Faisal Hospital

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LIST OF ACRONYMS AND ABBREVIATIONS

A&ED: Accident and Emergency department

MHA: Master of Hospital and Healthcare Administration

NUM: Nurse Unit Manager

IPC: Infection Prevention Control

WHO: World Health Organization

KFH: King Faisal Hospital

MT: Managerial Team

HAI: Hospital acquired Infections

CQI: Continuous Quality Improvement

ISO: International Organization for Standardization

NABH: National Accreditation Board for Hospitals & Healthcare Providers

JCI: Joint Commission International

OSHA: Occupational Safety Health Administration

MOH: Ministry of Health

DEFINITION OF KEY TERMS

Waste: a product, substance or material eliminated, discarded which is no longer in use, after completion of a process(1).

Mixture: a combination of different things which have recognizably distinguishable elements(2)

Sorting: Action of separating or putting thing apart(2).

Fishbone: It is also called Ishikawa diagram, are causal diagrams created by Kaoru Ishikawa that show a cause and effect diagram to help managers to know the reasons for imperfections, variations, defects or failures(3).

Strategic problem solving: It is a process of working through details to identify a problem or barrier to high quality care and implementation and brainstorming solutions to the identified problem(4).

CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND

The construction of King Faisal Hospital Kigali, started in 1987 and completed in 1991 by the help of the Saudi Fund for development (SFD) and it was designed to accommodate 200 beds, currently KFH operates with a total of 140 beds with the aim of providing specialized health care in Rwanda and reduce the large number of referred cases abroad(5).

It started slow as a dispensary to receive war casualties during 1990 to 1994 period. After the war, the hospital was run as public health institution under the Ministry of Health (MOH) and in 1998, the KFH was privatized to Netcare International, South Africa Healthcare group and started operating as a private for profit entity. KFH Kigali, is located in Kacyiru sector, Gasabo district, Kigali city and has got 509 employees among them 479 are full time employees and 30 part time employees.

KFH provides specialized services in:

- Internal Medicine with its subspecialties like Cardiology, Nephrology, Rheumatology, pulmonology, oncology-hematology.
- Pediatrics with subspecialties like pulmonology, allergy and nephrology.
- Ear Nose and Throat (ENT),
- Ophthalmology,
- Physiotherapy,
- Orthopedics
- urology and Accident and Emergency(24/7)(5).

The A&ED is a 24h and 7/7 operating unit, located at 5miles from main hospital entrance on the left side wing of hospital on the basement of the building.

TABLE 1: PRESENTATION OF ACCIDENT AND EMERGENCY DEPARTMENT

Characteristics	Number
Bed in accident and emergency department	15
Patients received in 2018	21600
Critically ill patients in 2018	320
Bed occupancy rate in emergency	96.5%
Accident and emergency staff healthcare assistant	4
Accident and emergency staff Nurses	18
Doctors	8

1.2 PROBLE STATEMENT

There was a high rate of waste mixture in Accident & Emergency Department at King Faisal Hospital. The problem was raised by Accident and Emergency Department(A&ED management as a point which got low mark by Infection and Prevention Control(IPC) manager and Committee of Quality Insurance CQI during their surveys. It was also shown by A&ED team into the handover meeting debrief and the team was indicating that the hospital policy on waste sorting is not being adhered compliantly. Then a team was formed in January 2018 to assess the compliance to waste sorting policy in Accident&Emergency Department,King Faisal Hospital as baseline.

The team found that the waste sorting policy was not complied to as observed into different bins at a rate of 84% which is high compared to the hospital standards that are set to 10%.

High rate of waste mixture is likely to cause infection.

1.3 OBJECTIVE

The objective of this study was to reduce the waste mixture from 84% to 16% from January 2018 to June 2019.

1.4 HYPOTHESIS

Ho: We assume that close supervision, increase of dustbins and staff training may not reduce the waste mixture in A&ED,KFH

H1: We assume that close supervision,increase of dust bins and staff training may reduce the waste mixture in A&ED ,KFH.

1.5. JUSTIFICATION OF THE PROJECT

The waste mixture can lead to HAI including incurable diseases and injuries to the hospital community and it is a threat to the environment. Therefore, this project will decrease the rate of the waste mixture by providing training to the staff on waste sorting, conducting close supervision and increasing the number of dustbins.

1.6 ORGANIZATION OF THE DISSERTATION

Chapter one is made of the background of King Faisal Hospital and Accident and Emergency presentation (table1), problem statement, objectives and hypothesis. Chapter two presents the literature review and relevant research associated with the problem.

Chapter three presents the methodology and procedures for data collection and analysis. Chapter four recaps various results concerning the reduction of waste mixture. Chapter five is about discussion of the results and how the intervention resolved the problem, how other researchers have addressed similar problems. Finally the study ends with chapter six which involves conclusion and recommendations.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The waste mixture at Accident and Emergency, KFH, has been shown as a problem due to harmful character of the hospital waste to the hospital population particularly and to the community in general.

This chapter talks about literature review in line with the waste mixture definition, waste mixture situation in different countries, waste mixture associated risks, types of waste collection bags and solutions to overcome waste mixture.

2.2. The waste mixture definition

The waste mixture worldwide is a combination of different categories of waste which was meant to be in a specific container (2).

2.3. The waste mixture situation in different countries

In the United States, they have on-site treatment or pickup by a biomedical waste disposal firm in charge of off-site treatment, and a mail-back disposal helping waste generators to send back the waste to the manufacturer and the regulations are strict and vary in different states. (13,14).

In India though there are a number of different disposal methods, the situation is desultory and most harmful. It is often found that biomedical waste is dumped into the ocean, where it eventually washes up on shore, or in landfills.(12).

Another study conducted in Gujarat, India, regarding what healthcare workers know on waste mixture associated risks, in facilities such as hospitals, nursing homes, or home health revealed that 26% of doctors and 43% of paramedical staff were unaware of the risks related to wastes

mixture and the study denotes that a large number of health care facilities were not sorting the waste correctly. (16)

A study conducted in Nigeria assessing the healthcare workers knowledge and practice of on waste management found that despite the high knowledge they have, their practice was still not adequate (17).

A study done in Rwanda about the knowledge and practice regarding waste management in operating rooms of three referral hospitals, showed that there was lack of equipment (71%), awareness and training (57%) and lack of supervision (45%) and this lead to increased rate of waste mixture to 90%(1) .

2.3. The waste mixture risks

Disposal of the waste is an environmental concern. Many medical wastes potentially lead: to the spread of infectious diseases, to accumulation of harmful substances or microbes in the person's body from land fill, to poison of the water from non-protected landfill and can even reach ocean life creatures and the cycle continues to the human who consumes sea creatures causing human growth development stunt and cause birth defect(18,19).

Further, there are opportunities for the general public to come into contact medical waste, such as needles used illicitly outside healthcare settings, or biomedical waste generated via home health care(7).

2.4. Types of waste collection bags

The healthcare personnel should be environmental friendly and accountable to hazardous waste generated (10). The determination of waste follows the WHO guidelines (11,12).

The WHO recommends that all waste must be separated at the point of generation and not re-separated after this point to reduce the risk of injury or infection associated with handling of waste, to healthcare providers, and hospital's clients and the community at large (6).

The waste collection should respect the following color coding as the World Health Organization recommends:

- black bags for low risk waste (7)
- red bags for bio hazardous waste (8).
- yellow bags for contaminated linens and all soiled reusable materials, with body fluids(8).
- white bags for food scrap (9) (10).

2.5. Solutions to overcome waste mixture

Health-care facilities are instructed to dispose medical wastes regularly to avoid accumulation. Medical wastes requiring storage should be kept in labeled, leak-proof, puncture-resistant containers under conditions that minimize or prevent foul odors. The storage area should be well ventilated and be inaccessible to pest(22).

Other possible solutions to reduce waste mixture would be initiative from corporations and hospitals is essential to creating a healthier environment, however, there are various methods in which involve action from the general population and would contribute to a clean air environment by creating surveillance groups within hospitals, everyone would be held accountable for misconduct and improper disposal of waste. Consequences could be implemented where individuals would be required to pay a fine, or face unpaid suspension from work. Companies and governmental organization should also initiate non-routine check-ups and searches; this would place pressure on hospitals to ensure that waste is properly disposed all year round. Voluntary clean-ups would involve hospital staff in assuring that medical waste is not littered around the hospital or thrown into regular garbage bins(24).

CHAPTER THREE: METHODOLOGY

3.1. STUDY DESIGN

This a pre and post intervention study conducted in order to find out the waste mixture rate in Accident and Emergency department at King Faisal Hospital. A baseline survey was carried out during pre-intervention and covered the period from April to May of 2018. We observed 23 dustbins to measure the magnitude of the problem. The root causes were identified by a team (staff) from Accident and Emergency department, researcher and unit manager during the morning staff meeting and the report of hospital IPC (Infection Prevention and Control) manager. The implementation covered the period of December 2018 to April 2019 and evaluation conducted in May 2019 to see the improvement on waste mixture in Accident and Emergency, King Faisal Hospital. Find attached activities Gant chart (annex1) and baseline tool (annex 2).

3.2. MAGNITUDE OF THE PROBLEM

To measure the magnitude of the waste mixture in Accident and Emergency, King Faisal Hospital, 23 dustbins were observed and in every dustbin three times a day: morning at start of day shift, midday and evening at the end of the day shift, for a period of 2 months thus the total of 4140 observations were done using tally sheet tool to collect data. Mixed waste by each colored bin was detailed in the table 2.

Table 2 indicates the observations done in 23 dustbins. There were eleven (11) red dustbins, two (2) yellow dustbins and finally 10 white dustbins and every dustbin contains its specific kind of waste. The accident and Emergency team together with the Unit manager found it useful to

address the problem because up to 84% waste mixture at baseline so the aim was to decrease the waste mixture up to 16% at the end of this interventional study.

TABLE 2: BASELINE ASSESSMENT

Color number of dustbins		Number of observations	Mixed	Percentage mixed
10 Red dustbins	1	180	140	77.7
	2	180	165	91.6
	3	180	172	95.5
	4	180	163	90.5
	5	180	151	83.8
	6	180	128	71.1
	7	180	174	96.6
	8	180	138	76.6
	9	180	173	96.1
	10	180	129	71.6
1 White dustbin		180	115	63.8
1 Yellow dustbin		180	178	98.8
11 Black dustbins	1	180	156	86.6
	2	180	149	82.7
	3	180	161	89.4
	4	180	175	97.2
	5	180	137	76.1
	6	180	153	85
	7	180	148	82.2
	8	180	156	86.6
	9	180	137	76.1
	10	180	144	80
	11	180	163	90.5
Total number of observations		180X23=4140	3474	84

3.3 ROOT CAUSES ANALYSIS

After sitting with the Accident and Emergency management and the staff, we brainstormed on the possible root causes and we have analyzed basing on people, environment, policy and procedures, and equipment. Therefore, the root causes were presented in the figure 1 below.

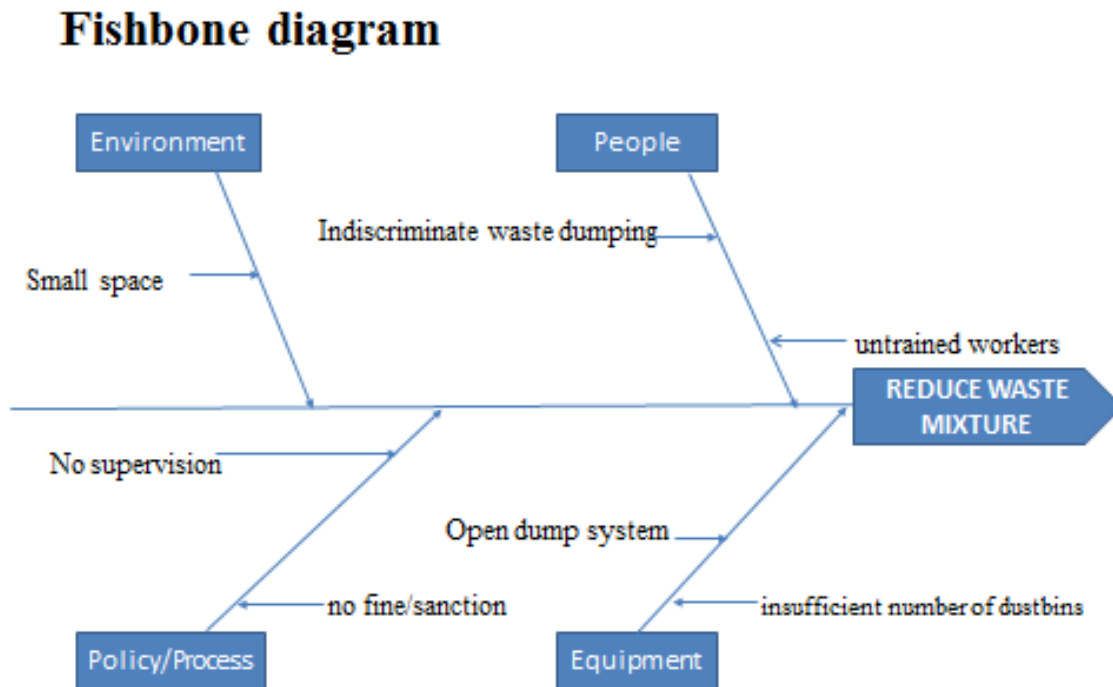


FIGURE 1.FISHBONE SUMMARIZING THE POSSIBLE ROOT CAUSES

3.3.1 VERIFICATION OF ROOT CAUSE

Every cause stated was verified and analyzed as follows:

Environment: the small space was suggested as one of the causes for poor segregation because the number of 4binsrequired in each room (red, black and white) do not fit in it. Mapping was used to measure the space and found that the room was smaller as shown on mapping.

People: indiscriminate dumping waste by untrained workers. The Accident and Emergency has intern student who are not trained as evidenced by questionnaire given to them, knowledge about colors of waste segregation was 40% and the staff were not monitored during their care delivery to know who mixes waste on a daily shift basis.

Policy/Process: waste segregation not followed and no frequent waste collection by the cleaners. It was noted that the cleaners collect the waste once a day that lead to mixture in dustbins on trolleys.

Equipment: there no enough bins and some are not working and not covered by observation.

The department had 23bins, among which 10 were working.

3.3.1.1 STAFF KNOWLEDGE ON DIFFERENT WASTE SORTING COLOR BINS

Accident and Emergency had 30staff among whom 8general doctors, 18registered nurses and 4 healthcare assistants. A sample of 15 was been selected because it is the daily number of staff on a shift. We selected 6 nurses on day shift and 4 nurses on night shift; 2 doctors general doctors,1healthcare assistant on day shift 1 doctor at night and 1 healthcare assistant, and asked about their knowledge towards waste segregation, among 15, 40% had responded that they do not know the waste type to put in yellow bag, 20% did not know the waste to put in red bag,10% black bag and 30% the waste to put in white bag.

Table 3. Assessments of knowledge about waste sorting bags

Questions	Yes	No	Percentage
Do you know the colors of waste bags	15	0	
Do you know the type of waste to be put in red bag	15	0	20
Do you know the type of waste to put in black bag?	14	1	10
Do you know the type of waste to put in yellow bag?	9	6	40
Do you know the type of waste to put in white bag?	10	5	30
Have you ever been trained about waste segregation	15	0	
Is waste segregation important in hospital setting	15	0	

SOURCE: PRIMARY DATA

The below figure 2 shows the staff knowledge on different waste sorting color bin

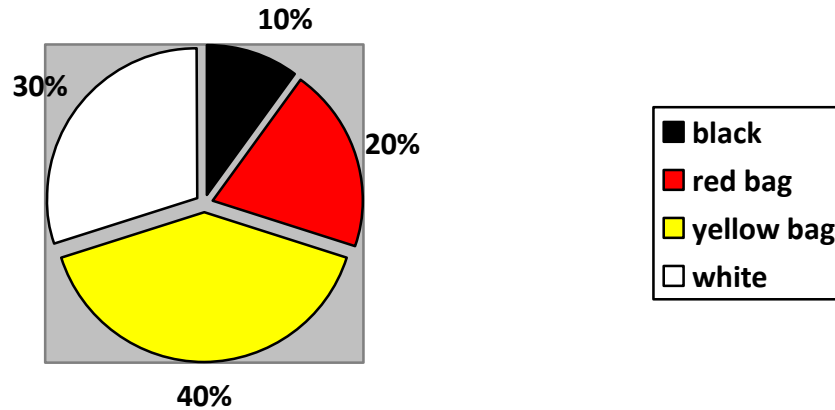


FIGURE 2: ASSESSMENTS OF KNOWLEDGE ABOUT WASTE SORTING BAGS

3.3.1.2 NO ADEQUATE MONITORING SYSTEM

Figure 3 shows that the supervision is not done adequately during the day and night. On daily roster, there is a nurse in charge of infection control but the nurse also has to treat the patients. Given that there's no room allocation of the nurses (see annex7), this leads to indiscriminate dumping as none is answerable to any found waste mixture. Everyone would not pay attention to waste sorting at point of generation.

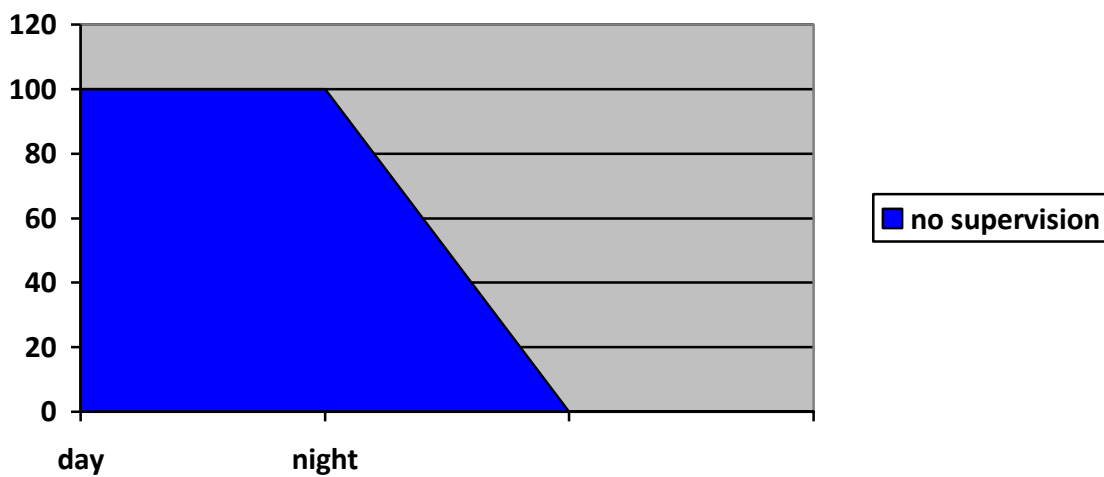


FIGURE 3: MONITORING SYSTEM

In intervention we have done nurse room allocation (see annex8) to facilitate the monitoring of waste mixture and everyone caught in her/his room allocation with waste mixture will be answerable.

3.3.1.3 POLICIES & PROCEDURES

The waste sorting policy (see annex9) is available but not followed and not frequently read. The waste collection by the cleaners, it is not done constantly, sometimes the cleaners collect the waste when dustbins are full and exceeded the dustbins top and this could be the factor of not sorting policy as one can find difficult to use a proper dustbin for instance for healthcare waste

when nurse has found the appropriate bin for healthcare waste is full. The below table 3 shows availability and reading of the policy.

TABLE 4: AVAILABILITY OF WASTE SORTING POLICY AND ITS READING

Criteria	Yes	NO	Total Grade
Available	1	0	
Regular reading the policy	0	1	
Follow the policy	0	1	
Total	1	2	1/3

Source: Primary data

3.3.1.4 EQUIPMENT

The observation done (see the table4) shown that in most of the rooms had no enough bins. The hospital policy (see annex 9) says that all clinical rooms must have black, red and yellow. All the rooms had a red bin for infectious waste and black bin for papers. Only the procedure room had the yellow bin yet in the other rooms as well a patient who have infectious disease could have slept on the linen but once they are removed, the nurse or healthcare assistant will walk a distance to get to the sluice room where soiled or infected linens are kept before being sent to laundry. The white bin is not available in all rooms and if the patient eats in the room, the patient will not be able to discard the food remaining so there is a risk of waste mixture because the patient will use the bin that is available.

TABLE 3: AVAILABILITY OF DUSTBINS

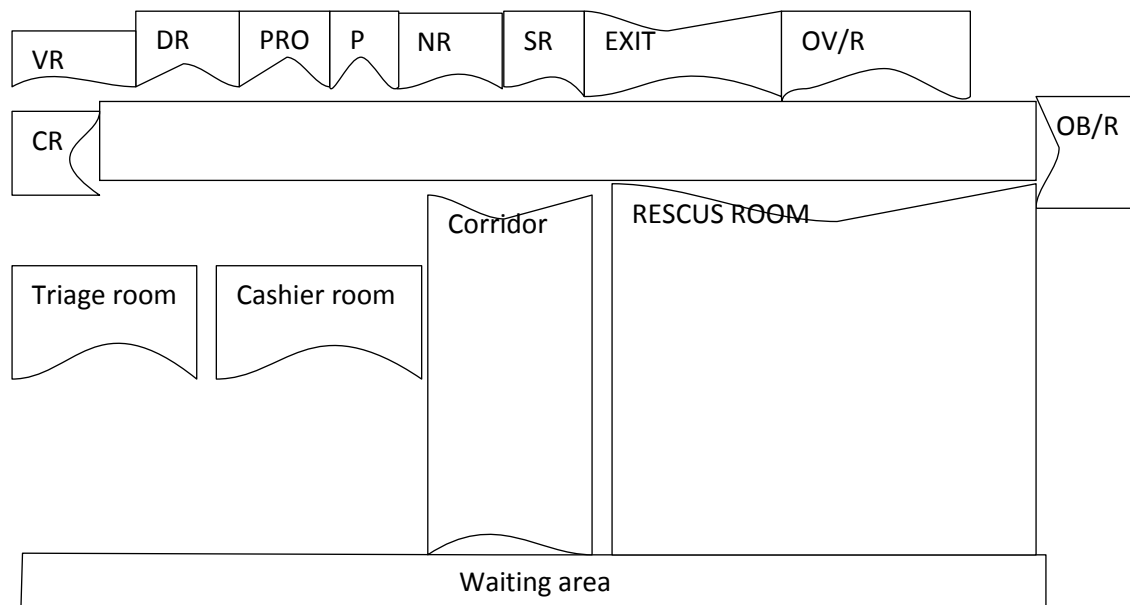
Room description	Date of observation	Red	black	yellow	white
Observation room	15/1/2019	1	1	0	0
overnight	16/1/2019	1	1	0	0
resuscitation	17/1/2019	1	1	0	0
procedures	18/1/2019	1	1	1	0
VIP room	19/1/2019	1	1	0	0

Source: Primary data

3.3.1.5 ASSESSMENT OF MAPPING FOR ACCIDENT AND EMERGENCY ROOM

The patient room (figure4) is small according to the required room standard of 92.8 square meter while the Accident and Emergency rooms have 3.2 square meter this can be cause of waste mixture due to lack of putting the 4bins.

FIGURE 4: ACCIDENT AND EMERGENCY DEPARTMENT FLOOR MAP



3.3.2 RESULTS FROM ROOT CAUSE ANALYSIS

In the sample of 15 Accident and Emergency staff, asked about what they see as the cause of waste mixture, all 15(100%) responded that inadequate supervision is the main cause,12(80%) responded yes on insufficient equipment, 11(70%) responded yes on policy and procedure not followed well, 6(40%) consider small space as a cause and 2 (10%) only consider the low knowledge as a cause of waste mixture and the root causes were plotted in the below table 5

TABLE 4. SUMMARY OF RESULTS

Roots causes	percentage
Lack of supervision	100%
Equipment	80%
No following well policies/procedure	70%
Small space	40%
knowledge	10%

Source: primary data

TABLE 6.THE ROOT CAUSE ANALYSIS PLAN

SOURCE OF INFORMATION	INFORMATION TO BE COLLECTED	WHERE TO BE COLLECTED	TOOL TO BE USED	RESPONSIBILITY	ENDING TIME
Peoples /staff	Indiscriminate dumping waste, untrained workers, most of the time accident and emergency has intern student who are not trained as evidenced by questionnaire given to them, knowledge about colors of waste segregation was 40% and the staff were not monitored during their care delivery to know who mixes waste on a shift daily basis.	Accident and Emergency	Tally sheet, , questionnaire	Principal investigator and daily SL	By 24 th April2019
Policies and System	Waste sorting policy not followed and no frequent waste collection by the cleaners, it was noted that the cleaners collect the waste once a day that lead to mixture in dustbins on trolleys.	Accident and emergency	-Tally sheet	Principal investigator and NUM	By15th April 2019
Equipment	There no enough bins and some are not working and not covered by observation	Accident and Emergency	Tally sheet	Principal investigator and NUM	By5th May2019
Environment	The small space is one of the causes for poor sorting as the number and color of dustbins which are required in each room (red, black and white) do not fit in it. Mapping was used to measure the space	Accident and Emergency	Mapping	Principal investigator	By 5thMay2019

3.4 INTERVENTION

Following the root causes analysis, the Accident and Emergency Team found that close supervision, increase of dustbins and training will be the best solution to reduce waste mixture.

To measure the best intervention, we used the comparative criteria (appendix5) for the decision matrix, impact, cost, time and feasibility for possible solution to compliance to reduce waste mixture.

TABLE 7.THE ANALYSIS DECISION MATRIX

Possible solutions	Impact	Cost	Time effect	Feasibility	Total
Close supervision	5	5	3	3	16
Equipment (increase number of dust bins)	5	3	3	4	15
Training	3	3	3	4	13
Renovation of A&E	4	1	1	1	7

Source: Primary data

3.4.1. SUPERVISION

Close supervision got 5 on impact because once it is done regularly, the staff will be conscious that if they mix waste, they will be answerable. Supervision will help the team to do waste sorting provided that once hands are caught in the pocket will lead to sanction, and it can be done with minimum time and no much cost associated to it.

3.4.2. INCREASING EQUIPMENT (DUST BINS)

The availability of dustbins will reduce the waste mixture as the staff will find appropriate means of where to dispose waste. The low score on cost was justified because the equipment need more monetary resources, and for high score on impact was reasonable because work is easy to reduce

waste mixture as the disposal of waste is present. Both time and feasibility obtained medium score because acquiring equipment involves a long process of procurement.

3.4.3. TRAINING

The training impact, cost and time scored medium because, the A&E staff has prior knowledge on the waste sorting, it requires the commitment of the staff which cannot be obtained most of the time. Feasibility scored high because teaching can be done through internal training in service plan and waste sorting policies are in place to facilitate the reduction of waste mixture.

3.4.4. RENOVATION OF A&E DEPARTMENT

The impact of renovation and space increase of A&E was significant while the cost, time and feasibility were graded with low score because they demand much monetary resources, long time and the feasibility is tough. The management has renovation plan in the future. The intervention strategies will be to make close monitoring of staff, to purchase enough dustbins and refreshment training of staff in A&E department.

3.5 MEASUREMENT OF INDICATORS

The measurement of intervention success, the outcome indicator was the overall reduction of waste mixture rate and the process indicators were the supervision, the increase of number of dustbins and the staff training.

3.6 DATA ANALYSIS PROCEDURES

The gathered data was analysed by SPSS version 22 and McNemar test was used to test the statistical significance of the data of pre and post intervention. A sample of 23 dustbins and 15 staff were randomly selected. It is mutually exclusive because we looked on a characteristic of

waste mixed or not mixed. We got a p-value of less than <0.05 for all indicators tested and this shows that the results were statistically significant.

3.7 ETHICAL CONSIDERATION

The ethical clearance was provided by Institutional Review Board (RIB) of University of Rwanda, College of Medicine and Health Sciences (UR/CMHS/MHA letter no Ref: CMHS/IRB/275/2019 in appendix 6)

CHAPTER FOUR: RESULTS

4.1 INTRODUCTION

This chapter presents results of the study analysis and interpretation of findings. This chapter shows the descriptive statistics of the respondents and the statistical test used to compare the waste mixture situation in pre and post intervention.

TABLE 5: DESCRIPTIVE STATISTICS OF THE SAMPLE RESPONDENTS

Descriptive Statistics			
	N	Maximum	Mean
Age of respondent	15	6	3.73
Education level attained	15	3	1.40
Working experience	15	4	2.80
Sex of respondents	15	2	1.67
Valid N (list wise)	15		

The table 6, indicates how the sample study is distributed. The total number of respondents was fifteen (15) and it was analysed by SPSS version 22. All variables were recorded newly for easy analysis and interpretation. For age the researcher recorded as 6:age <30 years , 5: 31-35 years, 4:36-40 years, 3:41-45 years , 2:46-50 years and finally 1 stand for above 50 years . Here the highest score was 6. And when looking for the mean , automatically you can easily know that below 30years are majority staff.

For education level, the researcher scored as 3: Diploma in nursing(A1), 2: Bachelor degree in medicine , 1: low level in nursing (A2) and on this variable , highest score is 3 this means majority of A&E staff have got diploma in nursing.

On working experience, the researcher scored 4: working experience less than 5 years , 3: between 5 and 10 years working in KFH, 2: 10-15 years working there and finally 1 stands for experience that exceeds 15 years. This means majority staff in AE have experience of less than 5 years.

Gender is the last variable we recorded and we used to make it like 1: Male and 2: Female, Descriptive statistics show that Workers in Accident and Emergency department, King Faisal Hospital have Advanced diploma with mean of 1.40 , A great number of them are in the range of less than five years working experience(2.8) , with the age below 30 years mean of 3.73 and finally women are more concentrated.

TABLE 7. MCNEMAR TEST SITUATION OF WASTE MIXTURE IN PRE AND POST INTERVENTION

. mcci 625 3515 666 3474

	Not mixed		
Mixed	Mixed	not mixed	Total
Mixed	625	3515	4140
Not mixed	666	3474	4140

McNemar's chi2 (1) = 1941.35 Prob > chi2 = 0.001

Exact McNemar significance probability P-value = 0.001

Table 7 is the output from SPSS and it is the crosstabulation showing how was the situation of waste mixture in Accident and Emergency, King Faisal Hospital before the intervention, it was a total of 3474 waste mixture and after it shifted from that highest number to 625. This means in total observations done of 4140, before intervention only 666 was not mixed and 3474 were mixed.

After intervention 3515 were not mixed and only 625 observations were mixed. The total number of dustbins were 23 every dustbin observed three times a day for two months period that makes 180 observations in each bin that make a number of 4140 waste mixture total observations and out of them, 3474 were mixed significantly that was 84% and it shifted considerably after intervention to the 625 mixture which equals to 15%.

The McNemar test is used to determine if there are differences on a dichotomous dependent variable between two related groups (for example exposed means mixed waste, not exposed means not mixed waste) meaning that McNemar test is used in case control studies to analyse the effect of each intervention paired with control.

It can be considered to be similar to the paired-samples t-test, but for a dichotomous rather than a continuous dependent variable.

Back a little bit in chapter one, hypothesis is saying that we have null and alternative hypothesis, the null one stated that close supervision, increase of dustbins and staff training will not reduce the waste mixture in A&ED, KFH and the alternative is the opposite.

If the statistical significance level (for example p -value) is less than 0.05 ($p < 0.05$), you have a statistically significant result and the proportion of waste mixture before and after the intervention is statistically significantly different. Alternatively, if $p > 0.05$, you do not have a

statistically significant result and the proportion of waste mixture before and after the intervention is not statistically significantly different (meaning the close supervision, increase of dustbins and staff training will not reduce the waste mixture in A&ED, KFH).

In our research, $p=0.001$ (using the exact p -value) with ((i.e., Exact Sig. (2-tailed)), which means that the proportion of waste mixture is statistically significantly different after the intervention as compared to before. Put another way, the change in the proportion of waste mixture following the intervention was statistically significant.

So now, we have enough evidence to reject the null hypothesis and confirm the alternative one that is saying that close supervision, increase of dustbins and staff training will reduce the waste mixture in A&ED, KFH

Generally, fifteen participants were recruited to take part in an intervention designed to warn about the dangers waste mixing in Accident and Emergency, KFH, an exact McNemar's test determined that there was a statistically significant difference in the proportion of waste mixture pre- and post-intervention, $p = 0.001$

TABLE 6. SUMMARY OF PRE AND POST INTERVENTION RESULTS TO REDUCTION OF WASTE MIXTURE

			PRE INTERVENTION		POST INTERVENTION		
Color number of dustbins		Number of observation	Mixed n	Mixed %	POST % N (%)	CHANGE %	P-VALUE
10Red dustbins	1	180	140	77.7%	37 (20.5%)	40.7%	0.001
	2	180	165	91.6%	18 (10%)	81.6%	0.001
	3	180	172	95.5%	10 (5.5%)	90%	0.001
	4	180	163	90.5%	15 (8.3%)	82.2%	0.001
	5	180	151	83.8%	49 (27.2%)	56.6%	0.001
	6	180	128	71.1%	32 (17.7%)	39.1%	0.001
	7	180	174	96.6%	24 (13.3%)	83.3%	0.001
	8	180	138	76.6%	24 (13.3%)	63.3%	0.001
	9	180	173	96.1%	13 (7.2%)	88.9%	0.001
	10	180	129	71.6%	45 (25%)	46.6%	0.001
1White dustbin		180	115	63.8%	33 (18.3%)	45.5%	0.001
1Yellow dustbin		180	178	98.8%	34 (18.8%)	80%	0.001
11Black dustbins	1	180	156	86.6%	31(17.2%)	69.4%	0.001
	2	180	149	82.7%	24 (13.3%)	69.4%	0.001
	3	180	161	89.4%	9(5%)	84.4%	0.001
	4	180	175	97.2%	15 (8.3%)	88.9%	0.001
	5	180	137	76.1%	24(13.3%)	62.8%	0.001
	6	180	153	85%	36 (20%)	65%	0.001
	7	180	148	82.2%	30(16.6%)	65.6%	0.001
	8	180	156	86.6%	26(14.4%)	72.2%	0.001
	9	180	137	76.1%	42(23.3%)	52.8%	0.001
	10	180	144	80%	39(21.6%)	58.4%	0.001
	11	180	163	90.5%	15(8.3%)	82.2%	0.001
Total number of observations		180X23=4140	3474	84%	625(15%)	69%	0.001

CHAPTER FIVE: DISCUSSION OF FINDINGS

5.1. INTRODUCTION

This chapter presents discussion of finding and achievement of the study on waste mixture in Accident and Emergency, King Faisal Hospital, challenges faced and their resolutions and lessons the researcher learnt through this research.

5.2. DISCUSSIONS

Before intervention, the waste mixture was high at 84% and this was a risk to both the patients and staff. A study done in Nigeria by Angus Nnamdi and al. in 2015 showed that waste mixture was at 72.1% and it contributed to the spread of nosocomial infections at 70.7%(25). The intervention study on waste sorting revealed that, there was overall significant change of 15%(26).

This considerable effect was not randomly achieved, there are some measures that have been taken considerably and the implementation of those ones brought Accident and Emergency, King Faisal Hospital to this good point of waste sorting policy compliance. After analysing and synthesizing the roots causes of high level of waste mixture, alternative solutions have been made and put into consideration and finally implemented which caused the positive shift.

On Lack of supervision during the day and night in A&E, there has been reinforcement supervision day and night and follow up the measures regarding the set of direction norms. Each nurse as the most waste generating agent was assigned a room and a trolley as a measure of control (see annexe8) and nurses are considered are the one with more knowledge on waste sorting.(9)

WHO endorsed sorting of the generated waste at source and thereby reducing the risks as well as cost of handling and disposal. Sorting is the most crucial step in bio-medical waste management(8)

Insufficient of equipment, A&E, KFH increased number of dust bins and replaced the old ones then in charge of supervision in A&E department will make follow up. Monitoring of staff also was the critical point and it was implemented in order to improve the compliance to the policy.

Finally, the training on IPC waste sorting was emphasized on and regular reading of waste sorting policies was done.

To achieve this goal resulted from working as a team during the entire period of the project and the support from Accident and Emergency management who demonstrated ownership toward the project.

5.3. CHALLENGES AND THEIR RESOLUTIONS

During intervention of the study, multiples challenges were faced. Initially, there was staff shortage in A&E and this put stress on few available thus resulting to poor compliance to waste sorting policy. To overcome this problem, the hospital engaged more staff and there was few dustbins and most were not functioning so the A&E purchased new bins. In addition, some staff were not taking the project as one of their priorities they were considering as not concerned about the compliance to waste sorting policy but finally got involved as it became one of points to consider in employee evaluation(27).

5.4. LESSON LEARNT

The lesson learnt from this project is that team work is very keen to such accomplishment. Working with the beneficiaries of the project is also important for the ownership and sustainability of the project. It has been revealed that quality improvement project it is mainly come from teamwork spirit that bring more involvement. It requires ownership from the team members from the beginning up to the end. However, this study had limitation as time of the implementation and evaluation was short. I also learnt that one can work with challenges and difficulties but finally the goal set can be achieved whichever the means.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 INTRODUCTION

This is the final chapter of the study that presents all conclusions as well as a set of policy recommendations formulated for further research

6.2. CONCLUSION

Before this study, at Accident and Emergency, King Faisal waste sorting policy compliance was at low level and the level of mixed wastes in Accident and Emergency was at the level of 84%. To increase its completeness, and eliminating the gap, the researcher investigated influencing factors and found out a set of factors that are lack of supervision, insufficient number of dustbins and lack of training. After intervention, a significant change was observed as it shifted to 15% of all waste. This achievement was a result of a close collaboration of Accident and Emergency Management.

6.2. RECOMMENDATIONS

The waste sorting is now an issue of priority and should be addressed due to its outcome on environment and human. Everyone handling waste has the duty of waste sorting at generation point(26). Accident and Emergency Management, King Faisal Hospital is recommended to ensure that interventions of this project are maintained.

The researchers and policy makers, should find interest on the waste mixture problem as it constitutes a harm to the human and environment.

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APPENDIXES

APPENDIX 1:IMPLEMENTATION PLAN: GANTT'S CHART

Task	Responsible	Time frame					
SUPERVISION SYSTEM							
PERIOD		DECEMB18	DECEMB 18	DECEMBE18			
Establish supervision	Unit manager of AE						
Inform staff on supervision plan	Unit manager of AE						
INCREASING NUMBER OF DUSTBINS							
		DECEMBER 18	DECEMBER 18	JANUARY19	FEBRUARY 19	MARCH1 9	APRIL19
Identify the need of dustbins	investigator&IPC link						
Request	Head of department						
Approve	Unit manager						
Purchase order	Housekeeping manager						
Delivery of dustbins	Housekeeping manager						
Inform and supervise proper use of dustbins	investigator						
TRAINING on proper use of dustbins	investigator						
POST INTERVENTIONS EVALUATION		2MAY 19	16MAY 19	23MAY19	30MAY19		
Data collection	investigator						
Data analysis	investigator						
Provide report activities	investigator						

APPENDIX 2: The root cause analysis plan

SOURCE OF INFORMATION	INFORMATION TO BE COLLECTED	WHERE TO BE COLLECTED	TOOL TO BE USED	RESPONSIBILITY	ENDING TIME
Peoples /staff	Indiscriminate dumping waste, untrained workers, most of the time accident and emergency has intern student who are not trained as evidenced by questionnaire given to them, knowledge about colors of waste segregation was 40% and the staff were not monitored during their care delivery to know who mixes waste on a shift daily basis.	Accident and Emergency	Tally sheet, , questionnaire	Principal investigator and daily SL	By 24 th April2019
Policies and System	Waste segregation policy not followed and no frequent waste collection by the cleaners, it was noted that the cleaners collect the waste once a day that lead to mixture in dustbins on trolleys.	Accident and emergency	-Tally sheet	Principal investigator and NUM	By15th April 2019
Equipme nt	There no enough bins and some are not working and not covered by observation	Accident and Emergency	Tally sheet	Principal investigator and NUM	By5th May2019
Environ ment	The small space is one of the causes for poor segregation as the number and color of dustbins which are required in each room (red, black and white) do not fit in it. Mapping was used to measure the space	Accident and Emergency	Mapping	Principal investigator	By 5thMay2019

APPENDIX3 QUESTIONNAIRE ABOUT COLOR CODE KNOWLEDGE

Questions	Yes	No	Percentage
Do you know the colors of waste bags	15	0	
Do you know the type of waste to be put in red bag	15	0	
Do you know the type of waste to put in black bag?	15	0	
Do you know the type of waste to put in yellow bag?	9	6	40
Do you know the type of waste to put in white bag?	10	0	
Have you ever been trained about waste segregation	15	0	
Is waste segregation important in hospital setting	15	0	

APPENDIX4 SUPERVISION ASSESSMENT TOOL

Date	Day/ Night	Supervision
11/12/2018	day	0
	Night	0
12/12/2018	day	0
	Night	0
13/12/2018	day	0
	Night	0
14/12/2018	day	0
	Night	0
15/12/2018	day	0
	Night	0
16/12/2018	day	0
	Night	0
17/12/2018	day	0
	Night	0

APPENDIX 5 COMPARATIVE ANALYSIS

Possible solutions	Impact	Cost	Time effect	Feasibility	Total
Close supervision	5	5	3	3	16
Equipment(increase number of dust bins)	5	3	3	4	15
training	3	3	3	4	13
Renovation of A&E	4	1	1	1	7

Source: Primary data

APPENDIX6 ETHICAL CLEARANCE



UNIVERSITY of
RWANDA

COLLEGE OF MEDICINE AND HEALTH SCIENCES

DIRECTORATE OF RESEARCH & INNOVATION

CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, 17/05/2019
Ref:CMHS/IRB/275/2019

UMUGWANEZA Claudine

Master of Hospital and Healthcare Administration,
School of Health Sciences, CMHS, UR


Dear UMUGWANEZA Claudine,


RE: ETHICAL CLEARANCE

Reference is made to your application for ethical clearance for the study entitled "*Low Compliance to IPC Waste Segregation Policy In Accidents and Emergency Department at King Faisal Hospital.*"

Having reviewed your application and been satisfied with your protocol, your study is hereby granted ethical clearance. The ethical clearance is valid for one year starting from the date it is issued and shall be renewed on request. You will be required to submit the progress report and any major changes made in the proposal during the implementation stage. In addition, at the end, the IRB shall need to be given the final report of your study.

We wish you success in this important


Professor GAIJUTU, Jean Paul
Chairperson Institutional Review Board,
College of Medicine and Health Sciences, UR



Cc:

- Principal College of Medicine and Health Sciences, UR
- University Director of Research and Postgraduate studies, UR

APPENDIX7. BEFORE INTERVENTION THERE WAS NO ROOM ALLOCATION



KING FAISAL HOSPITAL, KIGALI
Accident & Emergency Department

PatientCenteredCare

DATE									HOURS
NAMES/DAY		SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	

APPENDIX 8. HIGH LIGHT OF ROOM ALLOCATION AFTER INTERVENTION



KING FAISAL HOSPITAL, KIGALI
Accident & Emergency Department

Patient Centered Care

NAMES	DAYS	Sun	Mon	Tue	Wed	Th	Fri	Sat	Hour
	DATES								
VIP ROOM									
RESUSCITATION ROOM									
OBSERVATION									
OVERNIGHT									
PROCEDURE ROOM									

APPENDIX 9. SORTING OF WASTE POLICY



Patient-Centered Care

KING FAISAL HOSPITAL, KIGALI
POLICIES & PROCEDURES

HOSPITAL

SORTING OF WASTE

POLICY NUMBER: 173 /2009

RATIONALE:

To reduce the risk of injury or infection associated with handling of waste

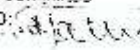

POLICY STATEMENTS:

1. All waste must be separated at the point where it is generated and not re-separated after this point
2. All waste must be placed in the appropriate bins as follows:
 - a. Black bags for low risk waste.
 - b. Red bags for biohazardous (clinical) waste.
 - c. Yellow bags for transporting contaminated linen to the laundry.
 - d. Clear/white bags for food scraps.
3. Sharps must be placed in the designated, puncture resistant, sharps containers.
4. All kitchen areas must have two bins: one with a black plastic bag, and one with a clear/white plastic bag
5. All utility rooms in all clinical areas must have three bins with bags as above in 2 a, b and c above.

This policy must be read in conjunction with the policy on Waste Management, Handling of Sharps and Handling of Waste.

NAME & DESIGNATION:

Ms. Judith K. Kyongo
Chairperson, Infection Prevention &
Control Committee

SIGNED:  

REVIEW DATE: October 2017

REVISION NUMBER: #3

NAME & DESIGNATION:

Dr. Joaquin Bielsa
Chief Executive Officer

SIGNED:  
REVIEW DATE: October, 2017
NEXT REVIEW DATE: October 2020